Estimate $I = \int_{-\pi/2}^{\pi/2} [\mathrm{sinc}(x)]^{300}\, dx$

This would be a difficult integral to do exactly, but it is possible to approximate. $\mathrm{sinc}(x) = \sin x / x$, and so the principal contribution to the integral will come from small x: $[\mathrm{sinc}(x)]^{300}$ will decay like x^{-300}. Therefore, we may use a small angle approximation

$$[\mathrm{sinc}(x)]^{300} = \left[\frac{\sin(x)}{x}\right]^{300}$$

$$\simeq \left[1 - \frac{x^2}{6} + \dots\right]^{300} \qquad \{|x| \ll 1\}$$

Since we are interested in small $x^2/6$, and because 300 is a large exponent, we can further approximate the integrand as

$$[\mathrm{sinc}(x)]^{300} \simeq \exp(-50x^2) \qquad \{|x| \ll 1\}$$

Our integral is then

$$I \simeq \int_{-\pi/2}^{\pi/2} \exp(-50x^2)\, dx$$

Since we only care about small x (large x contributes negligibly), we can extend the limits

$$I \simeq \int_{-\infty}^{\infty} \exp(-50x^2)\, dx$$

This is a standard integral with solution

$$I \simeq \sqrt{\frac{2\pi}{2 \times 50}}$$

$$\simeq \frac{\sqrt{2\pi}}{10}$$

We just need to estimate this

$$I \sim \frac{1.4 \times 1.8}{10}$$

$$\sim \frac{2.5}{10}$$

$$\underline{\sim 0.25}$$

[Exact: $I = 0.2505374638006364\ldots$; $\sqrt{2\pi}/10 = 0.25066282746310004\ldots$]